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The ECB art of central banking and the separation principle[1]

Christian Bordes* and Laurent Clerc**

Abstract

This paper examines the art of central banking as practised by the European Central Bank (ECB) through the prism of Goodfriend's (2009) determination of the three policies that fall within the remit of a central bank: monetary policy, which consists in varying the size of the balance sheet, credit policy, which consists in modifying the credit structure, and interest rate policy, which consists in adjusting the interest rates of the marginal lending and deposit facilities. The theoretical literature emphasises the existence of a separation principle between the first policy, which seeks to ensure monetary stability and the other two policies, which are intended to ensure financial stability through the smooth functioning of the interbank money market. This paper shows in particular that a central bank not only has the capacity but indeed must strive to separate the conduct of its monetary policy, which must seek to ensure medium and long-term price stability, from that of its credit policy, which is driven by short-term imperatives and consists in supplying the banking system with liquidity in the event of temporary money demand shocks. During the first part of the crisis, the ECB acted in accordance with the separation principle. However, it became increasingly difficult to apply as interest rates approached the zero-lower-bound. In effect, the unconventional measures adopted by the ECB created interference between its monetary policy, its credit policy and its interest rate policy.

Monetary Policy – operational framework – Eurosystem – separation principle

Classification JEL:E51, E52, E58

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[1] *The views expressed in this article reflect the personal opinions of the authors and are not necessarily those of their respective institutions. We are solely responsible for any remaining errors.*

1. Introduction

Central banks are assigned two goals: price stability and the smooth functioning of the money market, which is associated with the maintenance of financial stability in the narrowest sense. According to the separation principle, which can be considered as an application of Tinbergen's principle, a specific instrument must be assigned to each of these two objectives: monetary policy for the first objective and market operations for the second. According to the same principle, there must be no interference between the implementation of these two tools: in the conduct of monetary policy, central banks must set their key interest rates so as to achieve the goal of price stability that is assigned to them; in ensuring the smooth functioning of the money market, they must respond to disruptions in the capital markets by ensuring adequate liquidity. In practice, this principle is justified by the idea that interest rates are not the right instrument to deal with problems of liquidity and/or solvency for the following reasons: 1) They are ineffective for that purpose. 2) Such use may be inconsistent with price stability and the anchoring of inflation expectations. 3) It may also be a source of moral hazard. Consequently, the control of monetary policy must not be affected by any measures taken to restore the smooth functioning of the money market. The principle is also justified by the theoretical literature and, more generally, by academic work on the subject (Section 2). The ECB, like other major central banks, has acted in accordance with the principle, while nonetheless adapting it to the specific characteristics of the euro area (Section 3). The principle continued to guide its action during the first phase of the crisis from August 2007 to September 2008 but, as the crisis worsened, it became increasingly difficult to hold to and eventually had to be discarded (Section 4).

2. The separation principle in the literature

In the first work on the subject, which dates from the end of the 1970s, economic theory was used to present and justify the application of the separation principle in the framework of the monetary targeting model that was widely accepted at that time (A). Later work showed that the principle remained valid in the inflation-targeting model that subsequently became prevalent (B).

A. Separation principle and monetary targeting in a Ricardian model

To our knowledge, Niehans (1978) was the first to provide a full examination of the separation principle. He considered cases in which the central bank had adopted monetary targeting, which was the dominant monetary policy regime at the time of publication of his paper. His argument was based on the use of the theoretical model presented in Figure 1.

Figure 1

Niehans model equations (1980)

Government budget constraint: $G + B/p - T = (1/p)\Delta M_B + (1/ip)\Delta B - (p_A/p)\Delta A$	*(1)*
Treasury budget constraint: $G + B/p - T = (1/ip)\ \Delta B^T$	*(2)*
Central bank budget constraint: $1/i)(\Delta B^T - \Delta B) + p_A\Delta A = \Delta M_B$	*(3)*
Where: $\Delta B^T - \Delta B = \Delta S$	
Money supply: $M_t = mR_t;\ m > 0$	*(4)*
Bank reserves: $R_t - R_{t-1} = bM_{t-2} + \beta\ ;\ b < 0$	*(5)*
$M_t = M_{t-1} + mbM_{t-2} + \beta$	*(6)*

Variables: G (Public spending); T (Tax receipts); B (Government securities); M_B (Monetary base); A (Gold reserves); B^T (Treasury bonds); S (Internal credit); M (Money supply); R (Bank reserves)

The government budget constraint is represented by equation (1). It is divided into two parts: the Treasury constraint (2), which shows that the deficits are financed by the issue of public debt and not by issuing money, and the central bank constraint (3), which shows that the central bank issues money in the framework of non-monetary asset purchasing operations and pays the interest received on the securities that it holds to the Treasury. In equation (4) the money supply is positively related to the level of bank reserves while, according to equation (5), changes in bank reserves depend negatively on the amount of the money supply, with a two-period delay. By combining these two equations, we obtain equation (6) where the money supply depends on its past values.

A situation is envisaged in which the central bank is assigned three objectives: 1) Stability of long-term trends in the general level of prices. 2) The reduction of short-term fluctuations in production and employment. 3. The prevention of cyclical day-to-day and week-to-week fluctuations in banking liquidity. According to Tinbergen's principle, different instruments must be used to achieve each of these three goals. Thus, Niehans suggests that three distinct entities should be developed within the central bank, each being tasked with the pursuit of one of the three goals by means of securities trading operations, though in accordance with different constraints. A "price stability department" (PSD) is responsible for ensuring that long-term changes in the securities portfolio accord with the aim of long-term price stability, an "economic activity department" (AED) is established to carry out open market operations with a view to stabilising production by being required to deliver a zero operating balance over a five-year timeframe and a "liquidity department" (LD) is tasked with the management of banking liquidity, with a comparable constraint but over a shorter timeframe (maximum six months). This structure is the perfect application of the separation principle.

Under the proposed framework, in the event of a crisis, there should be no conflict between the provision of liquidity through open market operations and the control of long-term changes in the money supply. More precisely, prompt and vigorous intervention on the part of the LD should suffice to put an end to any panic without affecting the long-term trend of the monetary base or the money supply, since the temporary rise in notes held by the public and the excess reserves held by the banks would neutralise the effects of the injection of liquidity by the central bank (Humphrey and Kelleher, 1984). In other words, since the LD's exercise of the function of lender of last resort is limited to the very short term, there should be no conflict

with the pursuit of the goal of long-term price stability. On the contrary, as the LD's operations are intended to avoid any severe or sudden contraction in the money supply, they should be perfectly consistent with the PSD's gradualist control of M. In conclusion, far from being in conflict, the activities of these two departments should be complementary.

Leijonhufvud (2007a) describes the three pillars of a monetary targeting model: 1) Control of the money stock. 2) Stability of the monetary multiplier ensured by the reserve requirement system imposed on the banks. 3) A high level of inertia in the behaviour of the public as regards the holding of notes. In this model, monetary policy acts on the long-term determinants of the equilibrium value of the general level of prices, to which the effective value adjusts with "long and variable time lags". If the monetary base can be controlled, changes in money supply will be determined on the supply side and the financial system can be described as a Ricardian system (Leijonhufvud, 2007b). This was the situation that prevailed in the developed economies throughout the 1970s and, to a large extent, during the following decade, which explains the ascendancy of monetarism during this period.

Some lessons about the application of the separation principle in this type of model can be drawn from an analysis of the 1970s and the start of the 1980s. Andrew Brimmer (1984), who was a member of the Federal Reserve Board at that time, talks about the lessons of his own experience in this area. Theoretically, the Federal Reserve System should have: firstly, been ready to guarantee liquidity throughout the economy; secondly, sought to control growth in the monetary base in order to achieve its macro-economic targets (the eradication of inflationary pressures being key); thirdly, refrained from bailing out individual banks and exercised its function of lender of last resort through open market operations, preferably at the discount window. In practice, the Fed has on three occasions (during the Franklin National, Sea First and Continental Illinois episodes) failed to follow this guideline for tactical reasons, choosing instead to provide assistance to certain banks and intervene in particular segments of the capital markets. The Fed justified its stance by pointing to the systemic risks that the entire financial system would be exposed to by the failure of any one of the institutions concerned by these operations. Brimmer draws the following conclusion: a central bank that is tasked with guarding against risks that would imperil the smooth functioning of the financial system has responsibilities that extend far beyond the confines of monetary policy conduct.

B. Separation principle and inflation targeting in a Wicksellian model

The 1990s were marked by a shift from the Ricardian model to a Wicksellian regime: the reserve requirement system was eliminated or restructured so that it no longer acted as an instrument in the control of the money supply. A large number of assets that could be substituted for notes came into being. The monetary base is now determined on the demand side (Leijonhufvud, 2007b). We entered a world of pure inside money where the equilibrium value for the general level of prices no longer existed. This represented a radical change in the conduct of monetary policy, which henceforth consisted in targeting inflation directly through the steering of interest rates in the banking liquidity market. However, there were no notable effects on the merits and application of the separation principle.

Figure 2

Goodfriend and King model equations (2004)

Inflation: $\pi = INF(\mu_1; E\mu_2)$ (1)
Economic activity: $n = 1/(1 + \mu)$ (2)
Monetary policy rule: (3)
Rate policy t.q. $\mu = \mu^*$ *and r follow productivity trends*

Variables: π *(Inflation rate); n (Employment);* μ *(Margin rate); r (Real interest rate).*

Operator: *E (Rational expectations).*

Indices: 1 indicates the present; 2 indicates the future.

More precisely, the following policies can be identified (Goodfriend and King, 1988; Goodfriend, 2009): 1) Monetary policy, consisting in open market operations that modify the volume of the central bank's balance sheet with a view to controlling long-term changes in nominal values – the general level of prices, the inflation rate and the nominal interest rate – and, ultimately, short-term changes in economic activity. 2) Credit policy, which consists not only in regular lending operations but also in emergency bailouts for individual banks and other institutions and which leads to structural modifications – for a given value – of the central bank's balance sheet. 3) Interest rate policy, which consists in adjusting the interest rate paid on bank reserves in order to influence the level of interbank rates and indeed all short-term rates.

Monetary policy is conducted in accordance with the model presented in Figure 2[2]. Equation (1) indicates that the inflation rate depends on the observed and expected values of the marginal business rate. According to equation (2), the level of employment varies inversely with this same rate, as is the case in the real business cycle model. Finally, equation (3) is the expression of the rule that the central bank should ideally follow, which is to estimate and target the natural Wicksellian interest rate in order to ensure the stability of the general level of prices. In practice, as this rate is not known, the bank must monitor the inflation rate and, in the event of a sudden change in the latter, vary the interest rate in the opposite direction[3].

Monetary policy objectives should be achieved through open market operations alone and the central bank does not need to use the discount window (lending facility or Lombard facility) for this purpose. It follows that operations performed in this framework can, if they are sterilised appropriately, be used as instruments for credit policy. Such operations enable the central bank to lend liquidity selectively to individual banks without affecting the overall monetary conditions: "In other words [this facility] allows the central bank to supply lines of credit to individual banks in the same way as the latter provide credit to their customers" (Goodfriend and King, 1988, p. 11). Under these conditions, resolving the issue raised by Andrew Brimmer should not pose a problem: with a sufficient number of instruments the central bank is able, in normal circumstances, to establish a clear separation between monetary policy and credit policy.

[1] *In modern work on monetary policy, contrary to Niehans' supposition, the aim of monetary stability is not distinguished from the aim of stabilising economic activity. The conduct of monetary policy by the central bank seeks to ensure medium and long-term price stability, while operating a trade-off between inflation and economic activity.*
[2] *Goodfriend (2007) shows how, at the end of the 1990s, a consensus was established around monetary policy principles derived from this model.*
[3] *For Weber, Lemke, and Worms (2008), the usefulness of the concept of a natural interest rate is in practice limited, as it cannot be measured with sufficient accuracy.*

More generally, the separation principle is not contested in times of financial crisis. As part of its credit policy, the central bank is supposed to play the role of lender of last resort in such periods, lending freely, at a penalty rate, against collateral that would have been good in normal times but that may have suffered from the crisis (Thornton/Bagehot principle). It must inject the liquidity that financial intermediaries are unwilling or unable to offer. Cash is injected via the banking system but then spreads through the capital markets to non-banking financial intermediaries who are not in a position to access the securities market. Applying a penalty rate is a way of limiting the problem of moral hazard resulting from such operations by discouraging institutions that might otherwise take advantage of the occasion from participating unless and until their involvement becomes unavoidable (Mishkin, 2007b).

Applying the separation principle in a period of crisis in no way prevents the central bank from modifying its monetary policy. Indeed, the crisis may not only have short-term effects on liquidity but also affect economic activity and inflation in the medium term, or have long-term consequences for potential production (Neely, 2004). Although dealing with issues of liquidity falls within the realm of the central bank's credit policy, the consequences of the crisis on medium-term price stability, a key monetary goal, may require the authorities to modify the scope of monetary policy.

In the environment that has been familiar until now, where there is no floor rate but only a Lombard rate, the interest rate policy of the central bank is limited to setting the latter. The central bank may be induced to lower this rate, without however changing its monetary policy, if a liquidity shock hits the capital markets[4] without directly affecting the banking system. In this context, the banks must be encouraged to deliver liquidity where it is needed. They should therefore not be deterred by having to pay a penalty rate that is too high to allow them to procure such liquidity. But is there not a risk of fixing the Lombard rate at too low a level and of thereby increasing the problem of moral hazard? Mishkin (2008b) believes that this risk is minimal if the following two principles are applied: 1) The supply of liquidity must remain temporary and limited to exceptional periods where the existence of a systemic risk is clearly identified. 2) Even in extreme situations, the commercial banks must assume sole responsibility, and thus financial liability, for the lending operations that they undertake with borrowed liquidity.

Lastly, the way in which the financial system has developed over the last 20 years has challenged the traditional concept of the function of lender of last resort to which we have been accustomed up to now (Buiter and Sibert, 2007a). While the concept was appropriate for an environment where external finance was principally constituted by bank lending, it is not so useful in a world where credit is largely securitised. In periods of financial crisis, the central bank can no longer be content to be the lender of last resort. It must widen its function to include that of "market maker of last resort", firstly, by carrying out buying and selling operations on a wide range of private sector assets, and, secondly, by accepting as collateral a whole range of widely diversified private sector securities, both in the framework of its main refinancing operations and at the Lombard window. This does not however call the separation principle into question. In the event of a crisis, a reduction in the key interest rate is necessary if, and only if, the central bank thinks that the financial turbulence may have negative consequences on economic activity or on inflation. In that case, it must intervene immediately. Otherwise, it must not deal with the problem of capital market illiquidity by softening its monetary policy. This would mean that it was concerned about the situation in the financial markets in itself, independently of the implications for the real economy. Such a situation

[4] *This may be called a broad liquidity shock, borrowing from the terminology of Goodfriend (2002),*

would advantage a small number of financial institutions, and would not correspond to an appropriate use of public funds (Buiter and Sibert, 2007b).

Yet a liquidity management system that is limited to fixing a ceiling rate – such as that in effect in the United States before the crisis – is certainly not the most appropriate way of applying the separation principle. For Keister, Martin and McAndrews (2008), such a system does not eliminate all risk of tension between monetary policy and credit policy in times of crisis and it can lead to an improper use of resources. It is generally thought that on these two points a corridor system is better. It is one component of the system used by the ECB to ensure separation.

3. The ECB art of central banking and the separation principle in normal times

The ECB's decision to implement a hybrid two-pillar monetary policy strategy does not alter the argument developed in the previous section or its principal conclusion. Like the other major central banks, the ECB has clearly stated that it intends to maintain a clear separation between (A) its monetary policy and (B) its credit policy and its interest rate policy.

A. Monetary policy

The model shown in Figure 3 can be used to demonstrate the logic of the monetary policy conducted by the ECB in the framework of its two-pillar strategy (Bordes and Clerc, 2007).

Figure 3

Equations for the two-pillar model

(1) $x_t = -\varphi\left(i_{t-1} - E_{t-1}\pi_t\right) + \theta x_{t-1} + g_t$

(2) $\pi_t = \kappa_m + \phi(L)\pi_{t-1} + \lambda x_{t-1} + u_t$

(3) $i_t^* = \alpha + \gamma_\pi\left(E_t \pi_{t+k} - \pi^*\right) + \gamma_x\left(E_t x_{t+l}\right) + \gamma_M\left(\Delta m_t^{MTLR} - \Delta m^*\right)$

(4) $i_t = \rho i_{t-1} + (1-\rho) i_t^*$

(5) $x_t = y_t - z_t$

(6) $\alpha = r^* + \pi^*$

(7) $m_t - p_t = \kappa_y y_t - \kappa_i i_t + w_t$

Variables: x (Output gap); y (GDP); z (Potential GDP); i (Nominal interest rate); π (Inflation rate); g (Demand shock); u (Supply shock); p (General level of prices); m (Money supply); w (Money demand shock). (All variables, with the exception of interest rates, are expressed as logarithms)

Operator: E (Rational expectations).

Equation (1) is an *IS* curve where the demand for goods and services depends on the real interest rate and its past values. Equation (2) is a two-pillar Phillips curve (Gerlach, 2004) where: 1) Inflation dynamics are determined by past values (as is the case in the traditional Phillips curve). 2) The constant (κ_m) depends on the gap between the medium and long-term money supply trend (*MTLR*) and real balance demand trend during the same period:

$$\kappa_m = \left(\Delta m_t^{MTLR} - \Delta m_t^{d,MTLR}\right)$$

where Δm_t^{MTLR} and $\Delta m_t^{d,MTLR}$ stand for the trend growth rates of money supply and money demand respectively. Thus κ_m measures surplus money supply in the medium and long term. Equations (3) and (4) represent the behaviour of the central bank. The first indicates that the desired value of the interest rate (i^*) is set in accordance with an Ireland rule (2004), according to which the monetary authorities take into account not only fluctuations in the output gap and the inflation gap, as is the case with the Taylor rule, but also fluctuations in the money gap as measured by the differential between the observed value of the trend growth rate of the money supply and its benchmark value Δm^* consistent with π^*. Equation (4) introduces the possibility of a certain inertia in interest rate policy, which is shown by a smoothing out of the trend.

The ECB art of central banking and the separation principle

The degree of importance that should be accorded to monetary aggregates is a highly debatable issue. The ECB recognises that, in certain circumstances, trend M3 has played a decisive role in its decisions to modify its key interest rate. This was especially the case during the meeting of the Governing Council in December 2005, when the decision was taken to raise the rate against the recommendations of the OECD, the IMF and a large number of observers[5]. The ECB justified its decision by reference to its "binocular vision" of the situation and the importance accorded to the monetary pillar (Trichet, interview given to the FT, 17 May 2007). The bank also points out that the use that it makes of M3 is never mechanical. Considered alongside monetary assets, this pillar supplies the bank with very important data that can be used to cross-check economic analyses (i.e. the data supplied by the other pillar) against medium and long-term forecasts, even though the bank recognises its limits (for example, the dynamics of the components of M3 are still not well understood, in particular during periods where the yield curve is flat). This analysis is supplemented by an analysis of the counterparties – total loans, private sector loans, housing loans, non-financial business loans etc. – that takes into account the possibility of a credit boom leading to a potential bubble, for example in housing prices (Issing, 2005; Trichet, 2007).

A large number of experts and, above all, academics believe that excessive importance is accorded to the monetary pillar. Their criticism is based on the conclusions of a number of theoretical and empirical papers that have found monetary aggregates to be useless or unreliable markers. In particular, these studies show that monetary growth can no longer be used to predict inflation due to the significant and recurring shocks registered as a consequence of the speed of circulation of money, to such an extent that some Eurosystem governors have sometimes expressed reservations about monetary analysis. For example, Noyer (2006), in reference to the study by Bordes, Clerc and Marimoutou (2007) – who suggest there was a structural break in the trend circulation velocity of M3 as from 2001 when it began to fall at a rate of 3.5%, well above the benchmark value – admits the "chronic instability, even unpredictability" of the demand for money in modern market economies. De Grauwe (2007) expresses doubts even as to the usefulness of the monetary pillar by highlighting money supply shocks. He attributes the disconnect between inflation and monetary growth in the euro area (on average over the period 1999-2007 monetary growth, measured by M3, remained close to 7% while inflation was only 2%) to the transformation of the banks' activities, which has extended the maturity of their debts and shortened that of their assets. Under these conditions, strong M3 growth would not necessarily indicate an excessive creation of liquidity but would be the consequence of new activities by the banks, financed by issuing additional debt.

Gerlach (2007) puts forward another explanation for the reduced correlation between money and inflation in the euro area from the start of the 2000s. He takes a more general argument developed by Woodford (1994) and applies it to the euro area, assuming that monetary growth affects inflation but that the ECB manages to exercise complete control, as the economy evolves, over all the factors that might contribute to the rise in prices and to neutralise them by rapid and appropriate variations in interest rates. The bank would achieve its inflation target (slightly below 2%) and inflation would not be correlated with changes in the money supply, which would be determined by interest rates. More generally, in this case, it appears

[5] *For example, De Grauwe (2005) who refuted the argument that suggested a rate rise was necessary at that time because the acceleration in M3 growth signalled a danger of a surge in inflation. He noted that during the period 2002-2003 the annual growth of M3 had been approximately 8%. According to the monetarists, that should have resulted in a pick-up in inflation two years later, as famously predicted by Milton Friedman. However the rise in prices remained steady, at around 2.0-2.5%. "Having cried wolf in 2002-2003, the monetarists on the Governing Council are at it once again. We heed them too much. It remains to be hoped that if a rate rise is decided, it will not hurt the economic recovery in the euro area, which remains fragile." (De Grauwe, 2005).*

that none of the determinants of inflation dynamics would provide relevant data on price trends.

In response to these different criticisms, the Bundesbank has drawn attention to work by Scharnagel and Schumacher (2007) and Greiber and Setzer (2007) which seems to support the ECB's focus on money supply, accompanied by a number of proposals designed to improve the monetary pillar. It draws the following two conclusions from the studies: 1) The monetary indicators all contain data that are important for future inflation and must therefore play a role in the process of deciding monetary policy. (…) It is important not to single out just one of them. The information content of money growth for future inflation can be represented by inflation forecasts (…) in the form of fan-charts (…) showing the average values of inflation for the timeframe of the forecast. 2. By including property prices or property wealth in the standard demand function, we identify a stable demand-for-money function[6] even if the interactions between property prices and inflation as measured by the HICP (Harmonised Index of Consumer Prices) remain to be specified (Bundesbank press release).

Berger, Harjes and Stavrev (2008) take stock of the situation by reviewing the recent theoretical and empirical contributions on the subject.[7] Their conclusions are as follows: 1) Focusing solely on non-monetary factors would give the ECB a reductive vision of the economy. 2) Keeping the two pillars apart does not work well; combining them in the context of a general equilibrium approach simplifies the presentation of the decisions taken, allowing a clearer presentation of the role of money as it interacts with other economic and financial variables – including asset prices – and of their reciprocal effects on consumer prices.

B. Credit policy and interest rate policy

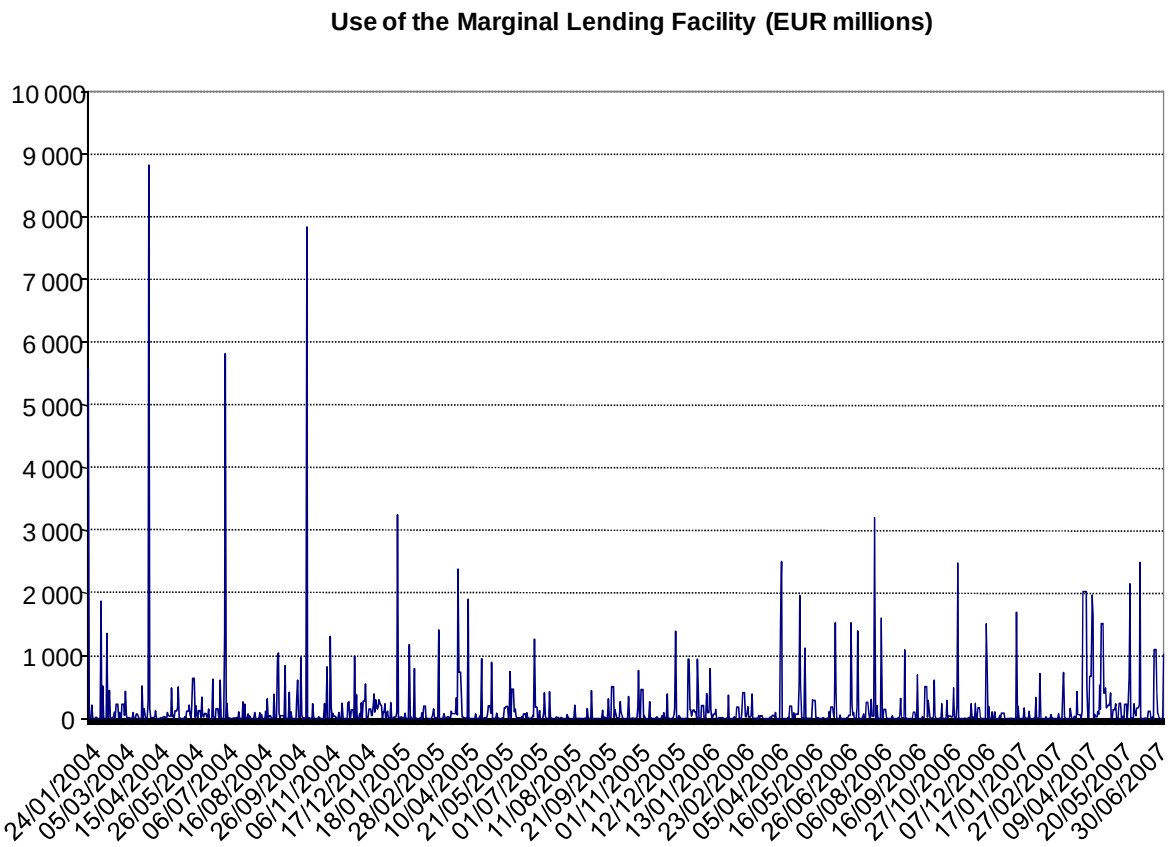
a) Following the definition given by Goodfriend, we can analyse the credit policy of the ECB by examining changes in the structure of the Eurosystem balance sheet. While the separation principle is maintained, this structure can be modified in the short term but must remain relatively stable in the medium/long term. In the following paragraphs, we look at the period that preceded the crisis (24 January 2004 to 10 July 2007).

In the short term, we can follow credit policy by examining how the use of the marginal lending facility has changed. This change, throughout the period in question, is represented in Diagram 1. As we can see, in normal circumstances, amounts can vary enormously. This was the case during 2004 for example, with several peaks that generally coincided with the last day of the reserve maintenance period. The highest values were observed during 2004 – on 6 April (EUR 8.8 billion); on 6 July (EUR 5.8 billion),and on 11 October (EUR 7.8 billion) etc. They subsequently remained much lower, never exceeding EUR 3 billion.

[6] *In the same press release, the Bundesbank recognised that "it is now widely accepted that the usual specifications of the money demand function fail to pass econometric stability tests".*

[7] *This study examines the main conclusions of a series of studies published by the IMF in the form of working documents; for example, Berger and Österholm (2008) and Berger and Österholm (2008).*

Diagram 1



For the medium or long term, we must first of all identify the typical structure of the Eurosystem balance sheet before observing whether it remains stable or not over time. To do this, we should start by calculating the average daily debt outstanding over the entire period under examination and the corresponding share of the different items in the simplified Eurosystem balance sheet (Table 1).

Assets include: 1) Autonomous liquidity factors constituted by the net foreign exchange reserves (41.9% of assets over the period in question) and the net value of the other autonomous factors (6.7% of assets). 2) Monetary policy instruments, which include main refinancing operations[8] (38% of assets), longer term refinancing operations[9] (13.4% of assets) and the marginal lending facility (zero on average over the period). On the liabilities side, we find: 1) Autonomous liquidity factors including notes in circulation (71.7% of the balance sheet total) and government deposits (7.4%). 2) The current account balance constituted by the reserve requirement (20.7%) and excess reserves. 3) Monetary policy instruments that show the net value of fine-tuning operations (0%) and the deposit facility (0%). A number of stylised facts emerge from this typical structure: on average, the liquidity created through the main refinancing operations (EUR 282 billion) is approximately three times greater than that injected in the context of longer term refinancing operations (EUR 99 billion); surplus reserve holdings by the banks are practically zero, and the marginal lending facility does not contribute to the

[8] *These are regular operations, taking place at weekly intervals and normally lasting a week. They are conducted as variable-rate tenders with a minimum bid rate, which is the ECB's key interest rate.*

[9] *These are operations to provide liquidity, performed monthly with, in normal times, a duration of three months. They are executed by means of normal variable-rate tender processes (the bid rates are not limited). The amount concerned (set at EUR 50 billion since the start of 2007) is announced beforehand.*

creation of central bank money. The latter observation is a perfect illustration of compliance with the separation principle.

Dividing the period in question into four sub-periods 24 January 2004 – 18 January 2005; 19 January 2005 – 17 January 2006 and 18 January 2006 – 17 January 2007, gives an overview of the stability of the balance sheet structure. As we can see, the relative importance of each of the items hardly changes, which is a further illustration of the medium to long-term neutrality of the credit policy and of compliance with the separation principle. However, it will be noted that during the months immediately prior to the onset of the crisis (from January to August 2007) the magnitude of longer term refinancing operations increased (from EUR 99 billion to EUR 142 billion on average) until they represented half of all main refinancing operations (the total amount of which remained stable at EUR 282 billion).

Table 1

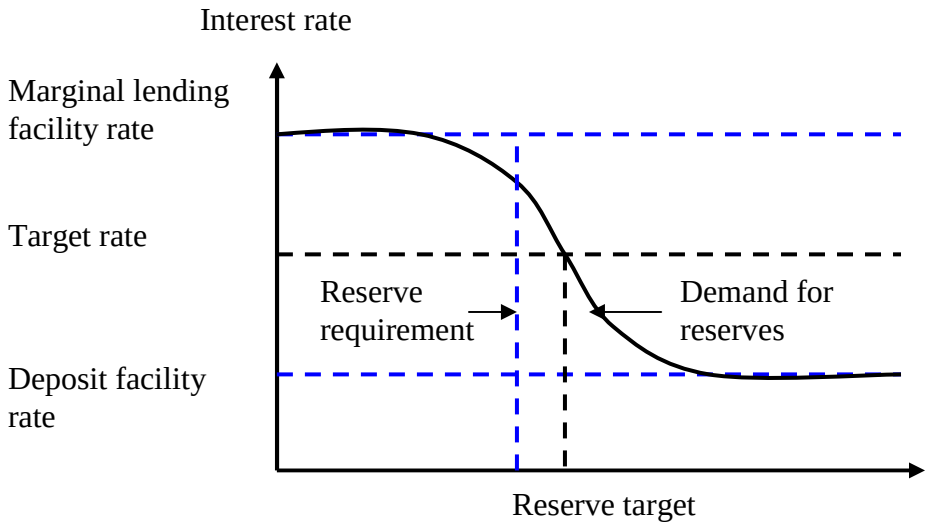
Simplified balance sheet of the ESCB (European System of Central Banks)

(Average daily debt outstanding over a given number of reserve maintenance periods)

	24/01/2004 10/07/2007		24/01/2004 – 18/01/2005		19/01/2005 – 17/01/2006		18/01/2006 – 16/01/2007		17/01/2007 - 10/07/2007	
Autonomous liquidity factors	euro billions	%	euro billions	%	%	%	euro billions	%	billion euro	%
Net foreign exchange reserves	311.7	41.9	301.5	46.66	41.9	46.66	329.0	41.01	323.7	38.07
Other autonomous factors (net)	49.9	6.7	290.0	4.49	6.7	4.49	489.9	6.11	95.3	11.21
Monetary policy instruments										
Main refinancing operations	282.1	37.95	243.3	37.66	37.95	37.66	307.4	38.31	288.5	33.93
Longer term refinancing operations	99.4	13.38	720.6	11.15	13.38	11.15	116.8	14.56	142.7	16.77
Marginal lending facility	0.2	0.02	0.2	0.03	0.02	0.03	120.8	0.02	0.2	0.03
Total	743.3	100	646.1	100	100	100	802.4	100	850.5	100
Autonomous liquidity factors										
Notes in circulation	532.9	71.68	454.4	70.335	71.68	70.33	580.6	72.34	617.0	72.54
Government deposits	55.2	7.42	539.0	8.34	7.42	8.34	559.9	6.98	49.5	5.82
Current account balance	154.9		137.5				165.4		183.1	
Reserve requirement	153.9	20.69	136.9	21.18	20.69	21.18	164.7	20.52	180.1	21.18
Excess reserves	1.0	0.14	651.0	0.10	0.14	0.10	710.1	0.09	3.0	0.36
Monetary policy instruments										
Fine tuning operations (net)	0.3	0.04	117.7	0.02	0.04	0.02	0.4	0.05	0.6	0.07
Deposit facility	0.2	0.02	0.190	0.03	0.02	0.03	0.2	0.03	0.3	0.04
Total	743.3	100	646.1	100	100	100	802.4	100	850.5	100

b) The interest rate policy of the ECB comprises two instruments: the marginal lending facility rate and the deposit facility rate. The ECB thus differs from the Federal Reserve by defining a symmetrical corridor, a solution also adopted by several other central banks (Australia, Canada and New Zealand). Woodford (2001; 2005) shows that this system represents an improvement over systems that implement only a Lombard rate. Goodfriend (2002) shares this point of view and proposes adding a further mechanism: separation[10] can be reinforced if the central bank's supply of reserves is sufficient to saturate the market. Keister, Martin and McAndrews (2008) offer a simplified presentation of the theoretical arguments in favour of the adoption of a corridor. Having set the target money market interest rate (i^*) and taking account of the demand for liquidity, the central bank fixes a goal for the amount of reserves and then modifies the reserve supply accordingly in order to maintain the rate as close as possible to this target. According to the separation principle, monetary policy consists in setting the target interest rate in terms of the macroeconomic goal(s) pursued, while interest rate policy is determined by the financial goal(s); if the central bank changes its target rate, it also modifies the rate on the marginal lending facility and on the deposit facility so that it does not have to vary its supply of reserves. The advantages of this separation can be illustrated if we envisage, for example, a situation where the demand for liquidity on the capital markets is very high – thus obliging the central bank to supply a large quantity of liquidity – and where, because of the economic situation, the bank wishes to tighten its monetary policy. By deciding to increase its three rates simultaneously and in the same way, the central bank can achieve both its goals: the rise in the target rate meets its macroeconomic goal, and raising the rates on the marginal lending facility and on the deposit facility meets the aim of financial stability as these rates enable the supply of liquidity to be maintained at its previous level.

Diagram 2: Separation in a symmetrical corridor system



The interest rate policy of the ECB can be followed by looking at the interest rate spread between its marginal lending facility and its deposit facility. In normal circumstances, to align

[10] *Whitesell (2006) argues that corridor systems have not always functioned in accordance with the theory.*

the money market rate with the rate on the main refinancing operations, the corridor is symmetrical. Except on the last day of the reserve maintenance period, the average level of the money market rate should remain close to the average of the rates applicable on both facilities, weighted according to whether the banking system is more likely to find itself in one or other of two situations (i.e. confronted with either a surplus or deficit of liquidity). More precisely, before the last day of the reserve maintenance period, the overnight rate at date t i_t is determined, in line with the martingale hypothesis, according to the following formula (Välimäki, 2008; Valla and Bahaj, 2009):

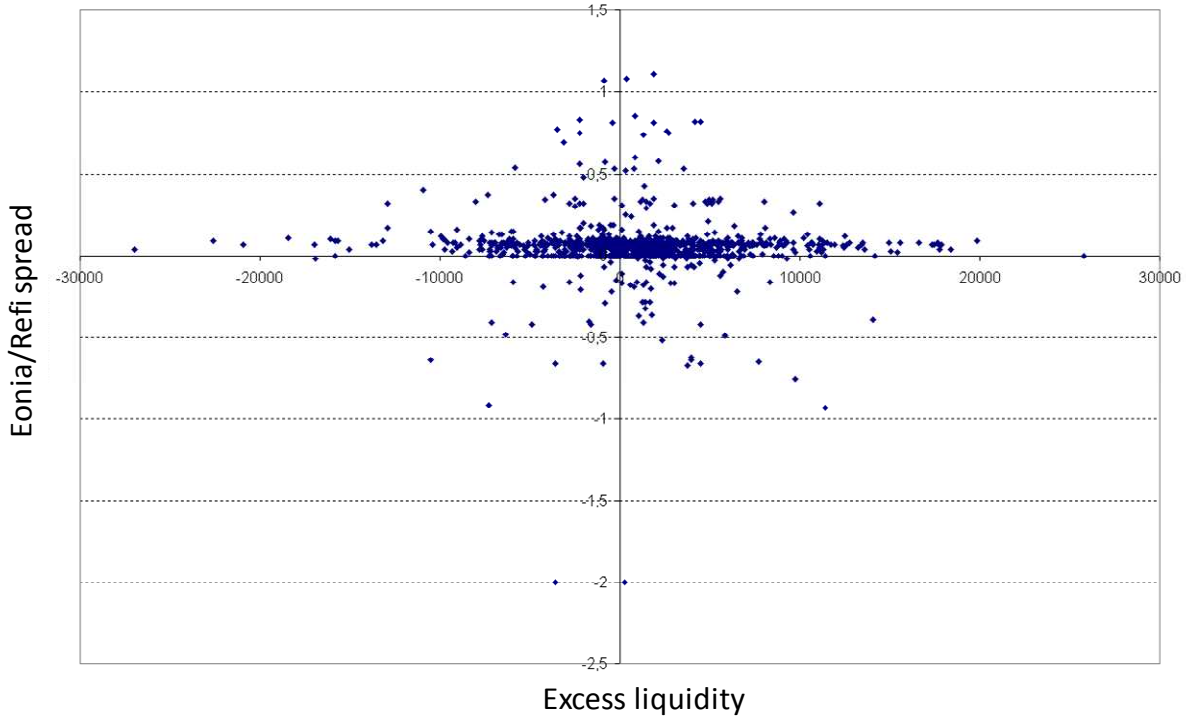
$$i_t = p_t i_{t,ml} + k_t i_{t,d} + (1 - p - k) E[i_T]$$

where: $i_{t,ml}$ is the rate on the marginal lending facility at date t, $i_{t,d}$ is the rate on the deposit facility and E $[i_T]$ is the expected value of the rate on the overnight money market on the last day of the reserve maintenance period (T). In normal circumstances, the goal of the ECB is for the banking system to be in a situation of neutral liquidity, which means that $p_t = k_t \approx 0.5$. The money market rates are then aligned with the middle of the corridor, which corresponds to the key interest rate (target rate in Diagram 1).

Changes to interest rate policy – in other words in the width and/or symmetry of the corridor – remain exceptional. Initially, and in order to simplify the move to a single money market, the Governing Council temporarily adopted a narrow corridor for the period from 4 to 21 January 1999, setting interest rates on the marginal lending facility and the deposit facility at 3.25% and 2.75% respectively while the rate on the first main refinancing operations was set at 3.0%. However, subsequently (from the end of January 1999) until the onset of the crisis (start of August 2007), the width of the corridor (200 basis points) and its symmetrical character did not vary. This remained so throughout the previously selected benchmark period (24 January 2004 to 10 July 2007); the relationship then observed between the daily values of the EONIA/Refi spread and surplus liquidity on the money market[11] is represented in Diagram 3; it is apparent that the ECB achieved its aims since most of the time market liquidity remained neutral (between ± EUR 10 billion) and the EONIA/Refi spread barely moved from zero.

[11] *Surplus liquidity = Current accounts at the central bank - Reserve requirement + Overnight deposits - Marginal lending facility*

Diagram 3: Surplus liquidity and EONIA/Refi spread



4. The separation principle and the ECB art of central banking during the crisis

Because the ECB has a modern operational framework, particularly designed to cope with crisis situations, the bank was able to dissociate monetary policy completely from credit policy between August 2007 and September 2008. The unprecedented situation that the ECB faced after the failure of Lehman Brothers led it, and other central banks, to radically alter its strategy profoundly and to adopt increasingly non-standard measures. This change in strategy created interference between monetary, credit, and interest rate policy. From October 2008, the separation principle, on which the action of the ECB had been based until then, was discarded in practice and was no longer mentioned in its communication.

A. The separation principle in practice during the crisis (August 2007 – September 2008)

The ECB was in an anomalous position when the financial crisis struck in August 2007. It was actually still pursuing the upward cycle of its key interest rates that had started in December 2005 and had just increased the rates by 25 basis points in June 2007.

The euro area economy had in fact entered a phase of accelerating activity in a context of growing inflationary pressures. Oil prices were sky-rocketing, reaching on July 2008 close to USD 150 per barrel, reached a historic high in. In addition, signs of tension in the jobs market were becoming noticeable. On 9 August 2007, the sudden drying up of liquidity caused BNP

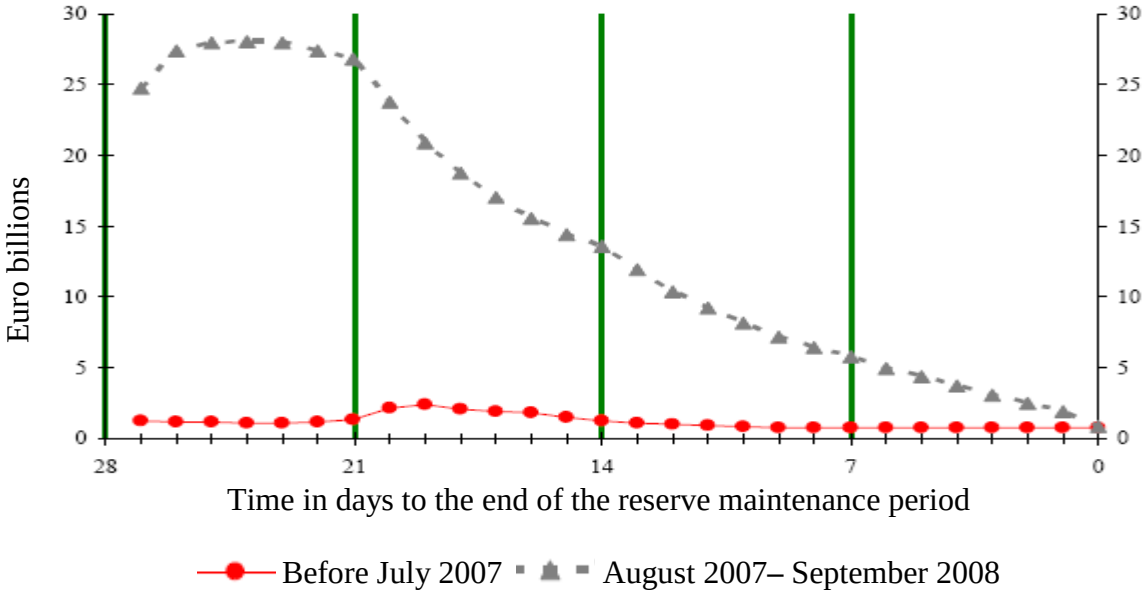
Paribas to freeze the activity of three pension funds operating on the ABS (Asset Backed Securities) market. The ECB intervened immediately by launching a tender at a fixed rate of 4%, thereby injecting nearly EUR 95 billion overnight. It also reacted by modifying its interest rate policy: the rate on the marginal lending facility fell *de facto* from 5.0% to 4.25% and became discretionary rather than automatic. The ECB repeated overnight fine-tuning operations in the days that followed, gradually withdrawing the liquidity injected previously. From 15 August, it used its main refinancing operations to manage the tensions on the money market.

At the same time, it underscored the distinction between monetary policy, aimed at price stability, and liquidity management in its communications and did not exclude the possibility of further tightening monetary conditions in the euro area if need be.

The ECB gradually implemented its credit policy from the end of August: the proportion of long-term refinancing operations, until then limited, became preponderant (nearly 66% of financing is now long-term against a little less than 30% before the crisis) while the importance of short-term refinancing operations fell accordingly.

In addition, to reduce the uncertainty of the banks as to their central liquidity needs over the reserve maintenance period, the ECB modified its schedule so as to inject a greater quantity of money than normally required at the start of the period. In total, as shown in Diagram 4, the average amount of excess reserves remained basically unchanged at the end of the maintenance period (indeed it was equal to that observed before the onset of the crisis). Therefore, the ECB did not increase the supply of reserves but simply adjusted their profile during each reserve maintenance period.

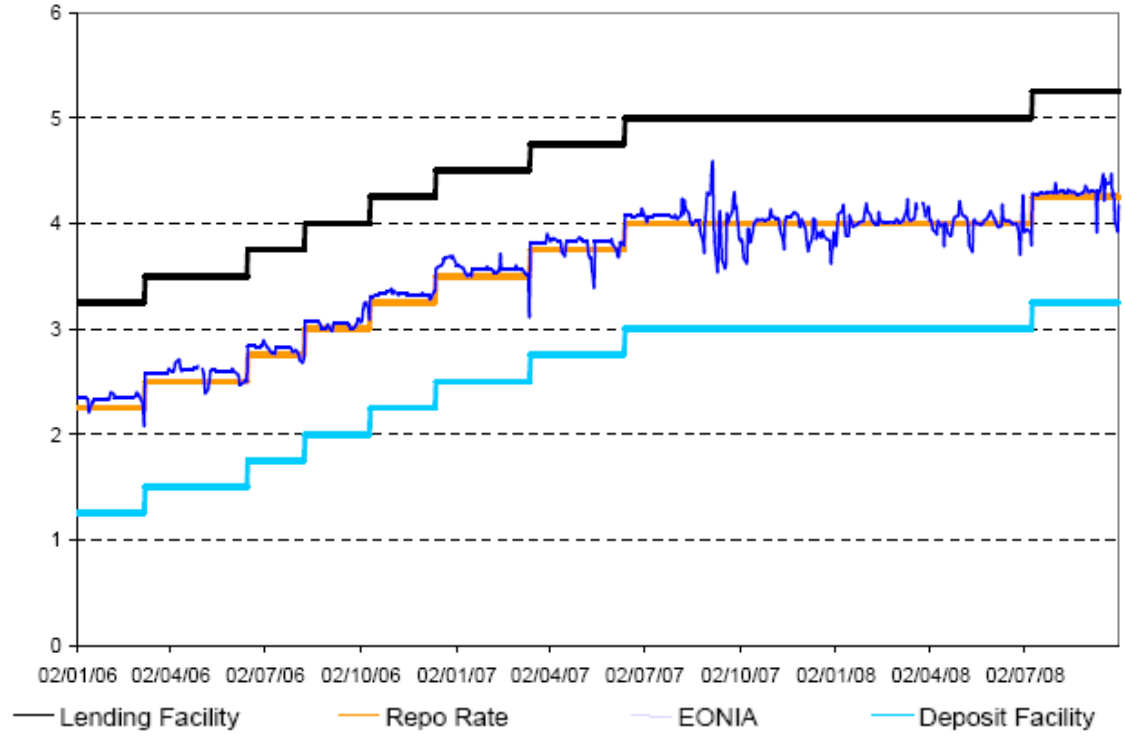
Diagram 4: Average daily amount of excess reserves (in euro billions)



Source: Cassola *et al*. (2008).

By using fine-tuning operations more frequently, the ECB succeeded in maintaining control over the short rate, which continued to fluctuate around its main policy rate (the minimum bid rate for main refinancing operations or the repo rate) (cf. Diagram 5).

Diagram 5: ECB key rates (January 2006 – September 2008)



Source: ECB

Despite an especially tight situation on the money market, particularly at the end of each quarter when the banks published their results, which were always poorer than initially forecast, and at the end of the year, when it injected nearly EUR 350 billion during the operation on 19 December 2007, the ECB succeeded in holding to its course. It even tightened monetary conditions again in July 2008 by increasing its key rates by a further 25 points.

Thus, throughout this period, the ECB succeeded in dissociating monetary policy, focused solely on maintaining medium-term price stability, from liquidity management and its credit and interest rate policies, intended to guarantee financial stability. In the end, applying the separation principle enabled the ECB to:

- stabilise the money market rate at a level close to the minimum bid rate for main refinancing operations;

- prevent liquidity management operations from having an impact on monetary policy expectations and ensure that overnight rate volatility was not transmitted along the rate curve.

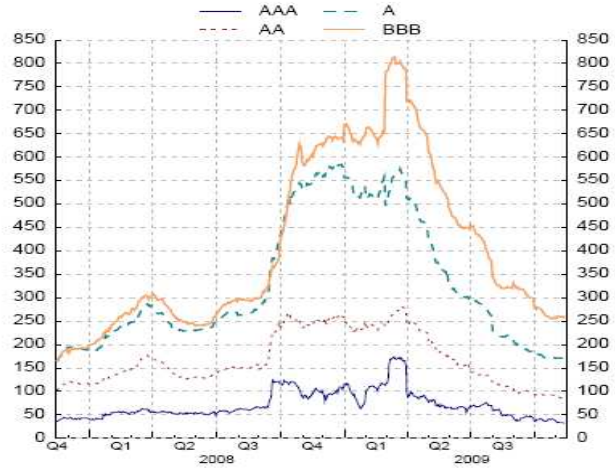
B. Non-standard monetary policy measures and challenges to the separation principle

The situation suddenly worsened again in the week of 7 to 14 September 2008. The announcement of the federal takeover of major US mortgage corporations Fannie Mae and Freddie Mac on 7 September was followed, on 14 September, by the announcement of the failure of investment bank Lehman Brothers, the purchase of Merryl Lynch by Bank of America and an increasing number of distress signals from Washington Mutual and insurer AIG. It rapidly became apparent that several market segments had virtually seized up,

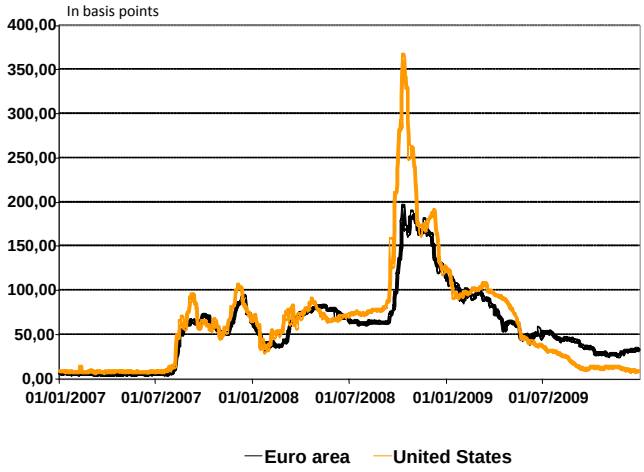
particularly the credit market where yield spreads reached prohibitive levels. The money markets and interbank markets experienced similar tensions as shown in Diagram 6.

Diagram 6

Spreads on corporate and government securities in the euro area (in basis points)



Spread between 3-month interbank and overnight indexed swap (OIS) rates in the euro area and in the United States



Source: ECB – Banque de France

The reaction of the central banks was immediate. The massive injections of liquidity at the end of September were followed by currency injections, especially in one-week dollars, and a doubling of the amount of dollar swaps with the Fed. During the week that followed the ECB also mobilised all the instruments at its disposal.

a. Monetary policy

On 8 October 2008, in an unprecedented, co-ordinated move to lower rates, the ECB joined the Federal Reserve, the Bank of England, the Bank of the Canada, the Swiss National Bank and the Riksbank (central bank of Sweden) to reduce its key interest rate by 50 basis points, thus reversing the cycle of rising interest rates.

This decision was accompanied by a major operational change: liquidity would henceforth be allocated through fixed rate tenders with full allotment, i.e. fully meeting the total demand for reserves from the banks.

The main aim of this measure was to reduce uncertainty with regard to the supply and cost of liquidity as much as possible in order to free up the money market. The second aim was to maintain complete control over short rates and hence over interest rate levels in the economy in order to preclude an increase in the cost of finance and any resulting depressive effects on economic activity.

This was the first non-standard measure adopted by the ECB. Initially forecast to last as long as circumstances required and until at least the start of 2009, this measure was subsequently extended until at least October 2010. Under this measure, the ECB undertook to meet the

entire demand for reserves from the banks at prevailing interest rate conditions within a timeframe of up to six months ahead. The implications of this measure were highly significant.

First, the ECB increased its role as intermediary in the money market and, given the very attractive conditions at which it supplied this liquidity, became the main or even the only supplier for the different time frames covered by its operations (i.e. one week to six months). Moreover, these injections of liquidity were no longer sterilised from October 2008. This resulted in a significant increase in the size of the ECB's balance sheet, which more than doubled.

Thus, the ECB acted as a replacement for the short-term market segments, which had seized up. Interference appeared gradually, first of all between the ECB's willingness to ensure intermediation in the money market and its desire to reactivate this same market.

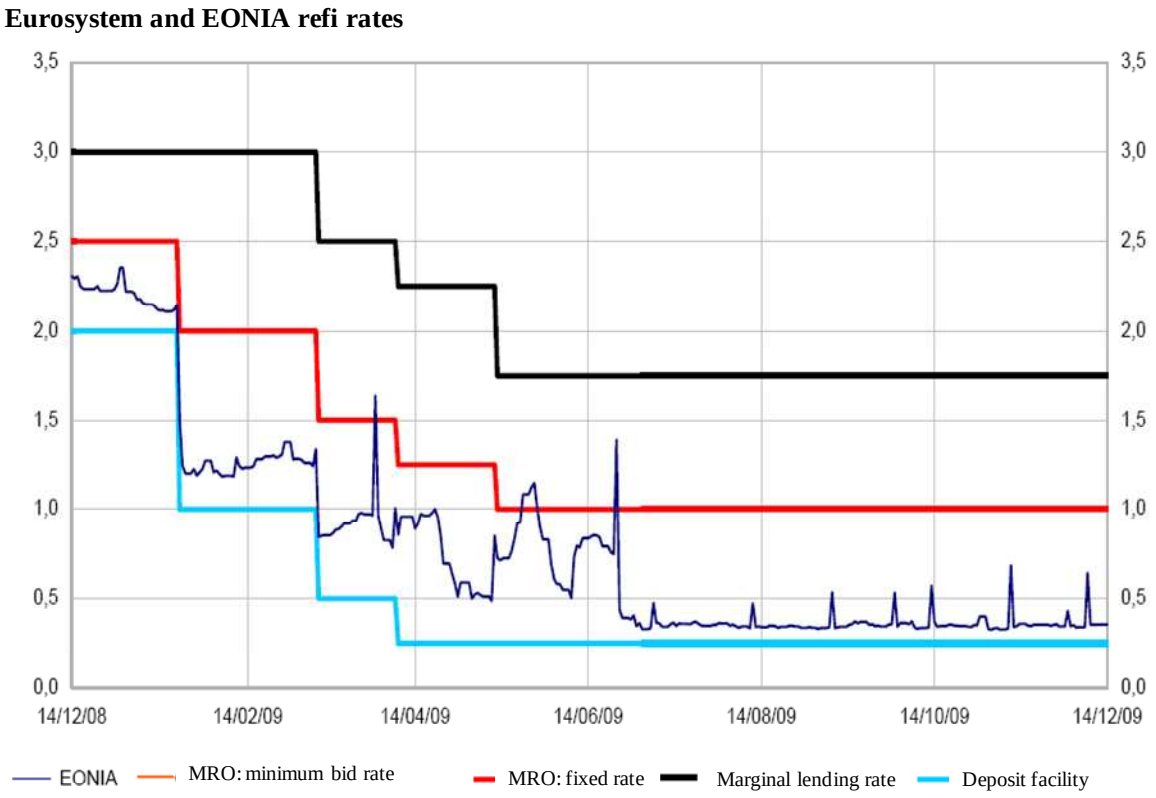
In addition, the ECB ran the risk of seeing the market interpret the minimum rate at which its main refinancing operations were performed, which was identical whatever the maturity of the operation, as signalling that monetary policy was aligned on a six-month timeframe. As a result, the operational framework of the Eurosystem was no longer seen as necessarily being organised around controlling the EONIA (Euro Overnight Index Average), which had previously been considered the ECB’s operational target, but ultimately as being organised to support a longer term rate.

The effects of this measure compounded the impact of the narrowing of the interest rate corridor, which was decided the same day (cf. below). The result was strong downward pressure on the EONIA amid an abundant supply of liquidity. The EONIA, which until then had hovered around the key interest rate (i.e. the minimum bid rate), suddenly peeled off by some 40 to 50 basis points and steadily approached the deposit facility rate (cf. Diagram 7). The separation principle was thus shattered.

Indeed, in the absence of operations aiming at a resumption of liquidity, the ECB abandoned control not only of the overnight rate, but also over the short end of the yield curve. The fall in the EONIA was passed on in full to the short-term yield curve. The market rate neared the deposit facility rate and thus moved away from the fixed rate for a sustained period. Some market operators then raised the question of the monetary policy signal: what was the ECB's real key rate?

The ECB nonetheless achieved its goal: these measures enabled it to lower the short rate significantly and therefore to reduce the cost of financing the economy. Since then, the monetary policy signal has been transmitted not only by the main refinancing rate, but by all the key rates and indeed, more broadly, by the quantitative measures adopted by the Eurosystem. As a result, announcements by the ECB have become increasingly complex.

Diagram 7: ECB prime rate and the EONIA (May 2005 – December 2009)



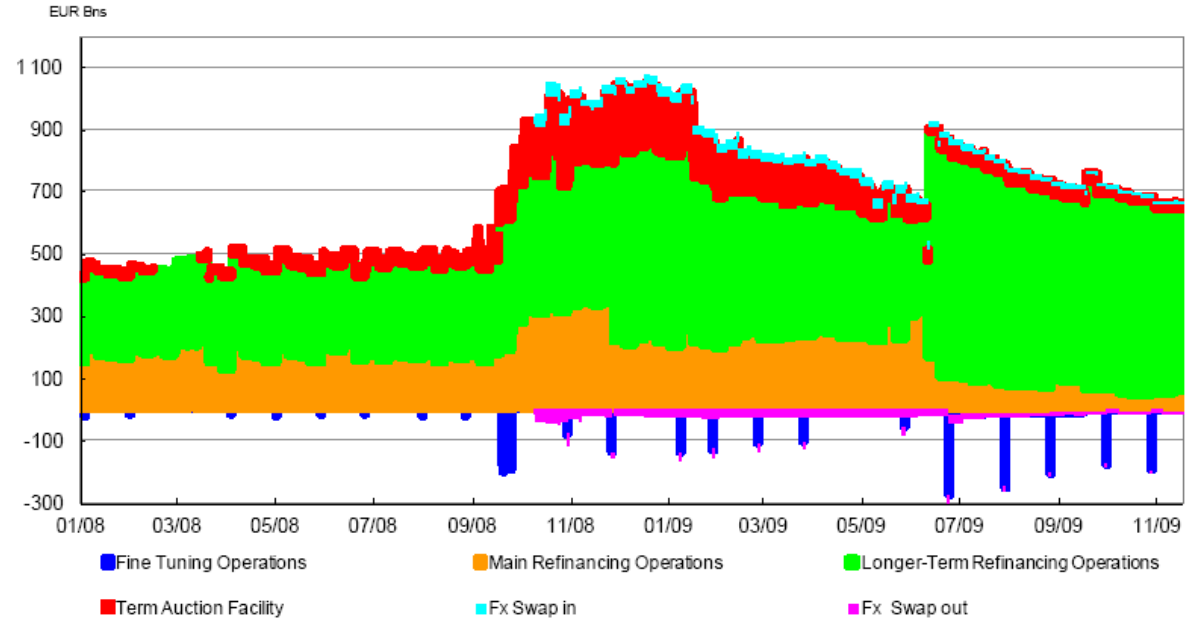
Source: ECB

b. Credit policy and interest rate policy

a) As from October 2008, the structure of the ECB balance sheet was modified in important ways (Diagram 8). This was indicative of a major change in its credit policy, which was accompanied by an increase in the size of the Eurosystem balance sheet as a result of the softening of the criteria for eligibility to its main refinancing operations. After 22 October, the threshold for accepting securities lodged as collateral with the Eurosystem was lowered from "A-" to "BBB-", with the notable exception of Asset Backed Securities (ABS). This loosening was the consequence of adopting the policy of supplying unlimited liquidity at a fixed rate. It enabled counterparties to double their refinancing potential.

The proportion of long-term refinancing operations continued to increase to the detriment of one-week operations. At the beginning of October, the ECB finalised the Term Auction Facility signed a year previously with the Fed, which enabled it to lend dollars to banks in the euro area, joining with the Bank of England and the Swiss National Bank in operations to lend unlimited quantities of fixed-rate dollars at maturities of 7, 28 and 84 days. Though this facility had no direct impact on financing conditions in the euro area, it nevertheless contributed to improving overall refinancing conditions.

Diagram 8: The Eurosystem balance sheet



Source: ECB

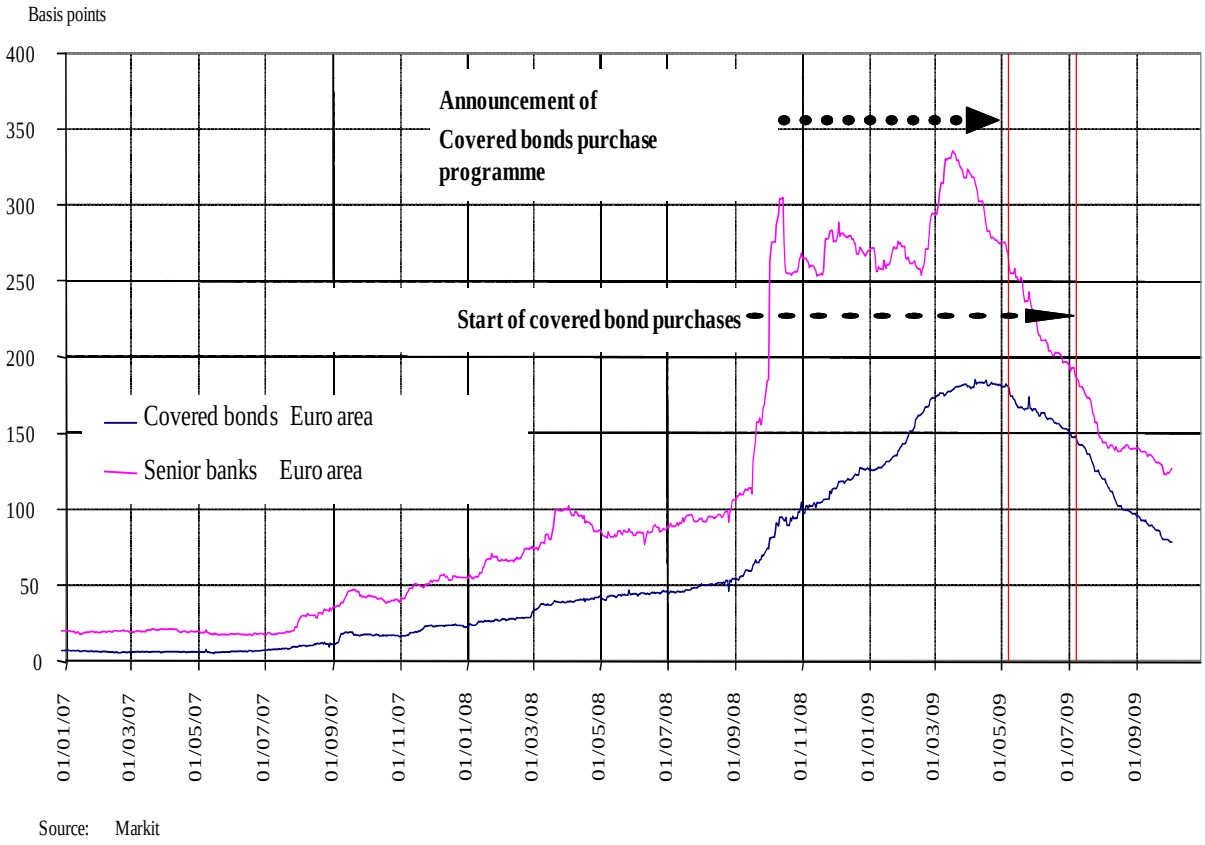
Finally, on 7 May 2009, the ECB announced three other non-standard measures intended to reduce the cost of financing the banks and hence the euro area economies.

These measures were as follows:

1. Covered bonds issued by the banks were purchased in a total amount of EUR 60 billion. This measure was designed to dispel some of the uncertainty that impeded medium-term financing of the banks. Eurosystem refinancing operations covered the need for short maturities, up to six months at first and extended to one year as from 7 May 2009, while government schemes to support the banking sector guaranteed longer term financing (generally three to five years). Thus, the measure aimed to reduce risk premiums on medium-term maturities and create an incentive for the banks to finance new loans in the euro area.

The measure seems to have had a major impact on the covered bond market as soon as it was announced. The issue schedule, which had been interrupted when the crisis worsened, saw a substantial pick-up in the number of issues during May (more than ten new issues) and their price reacted positively to the ECB announcement (cf. Diagram 9).

Diagram 9: Difference in yield between covered bonds issued by banks and swaps with the same maturity (iBoxx indices)



Source: Markit

2. The maturity of refinancing operations conducted as fixed rate tenders with full allotment was extended to one year. Three operations of this type were conducted in 2009, the first two in June and September at a rate of 1.0%, the last in December at a revisable rate corresponding to the average minimum refinancing rate over the maturity of the operation. Thanks to the very advantageous conditions at which the first operation was executed, an exceptional amount of EUR 442 billion was allocated to the banks. The following two operations met with less success, the amount allocated being in the region of EUR 75 billion in September and EUR 97 billion in December. In the latter case, however, the switch to a variable rate introduced uncertainty as to the cost of the refinancing operation, especially as the ECB also carried out two other refinancing operations in December, at a fixed rate of 1.0% and with three and six-month maturities. This partly explains the decrease in the number of banks involved in the tender, which fell from 1,121 in June to 589 in September then 224 in December. The other explanatory factor was the reduced demand for reserves from the banks, especially from the large institutions.

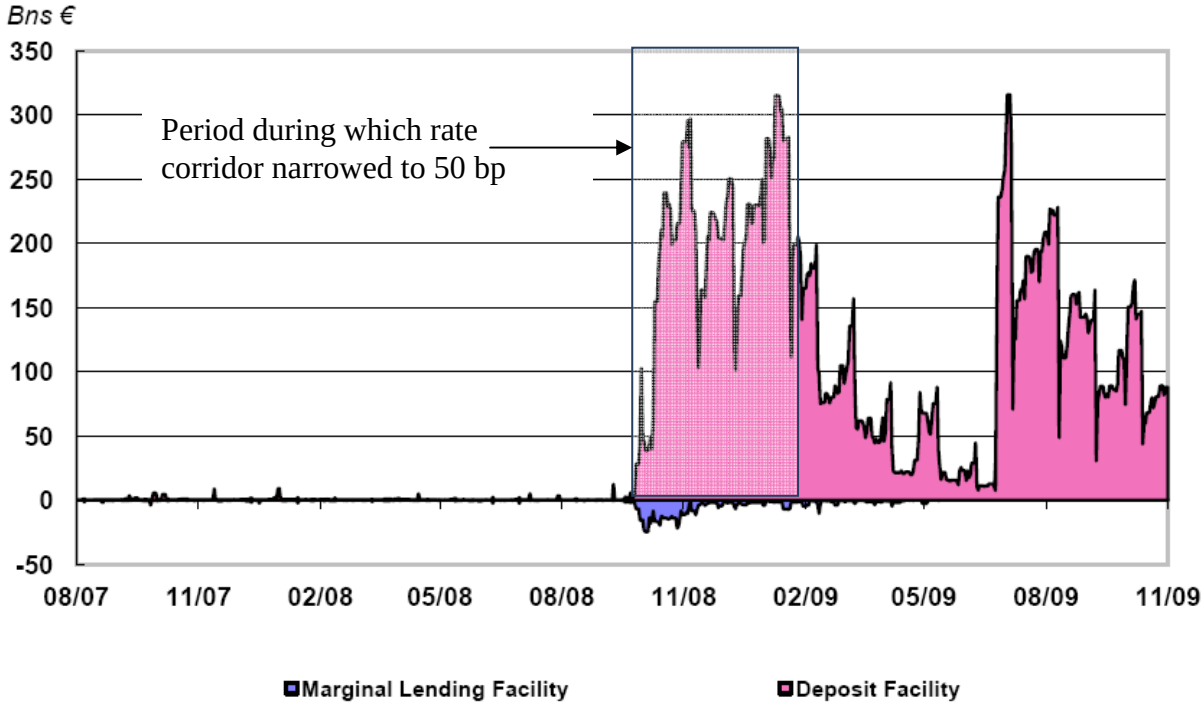
3. The European Investment Bank was accepted for a three-year period as an eligible counterparty to main Eurosystem refinancing operations. It is generally thought that this measure could generate additional loans of some EUR 40 billion in the euro area.

b) This radical shift in credit policy was accompanied by major changes in interest rate policy. On 8 October 2008, the ECB followed up its decision to lower interest rates by reducing the

interest rate corridor, which decreased from 200 to 100 basis points around the minimum bid rate for main refinancing operations. This measure, intended to limit volatility on the money market, nevertheless created interference with the bank's other two policies.

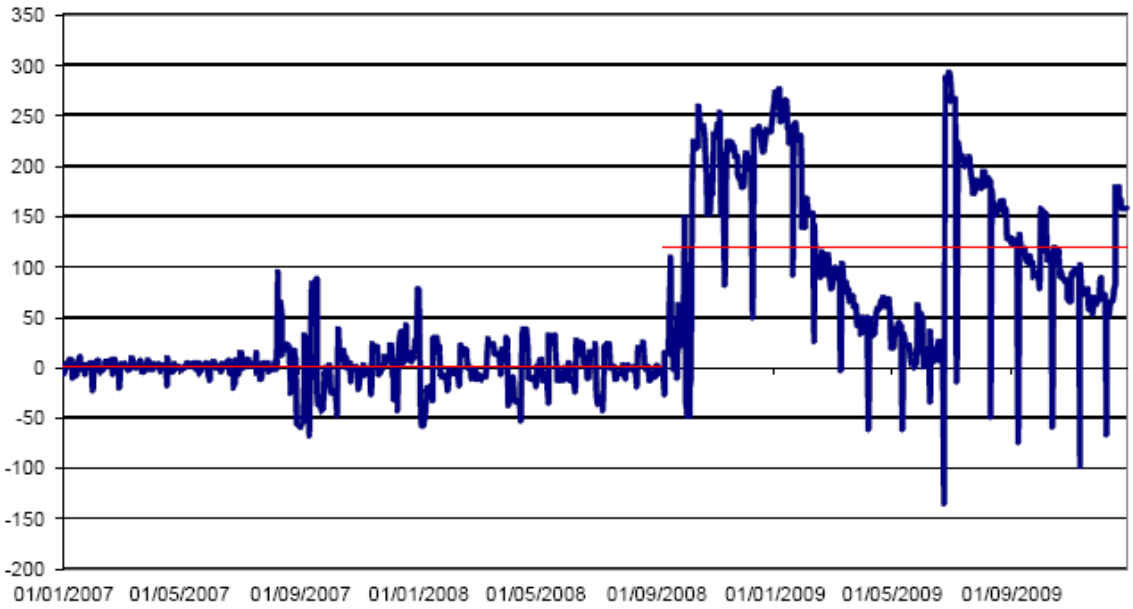
First of all, the change to full allotment fixed-rate tenders rendered the lending facility rate practically obsolete. The interest rate corridor became asymmetrical in practice, with the ceiling being the minimum bid rate for main refinancing operations. By definition, the overnight rate could therefore no longer fluctuate around the minimum bid rate. The adoption of an asymmetrical corridor was well-suited to the crisis situation facing the Eurosystem: it allowed the banks to acquire marginal ECB liquidities on attractive terms while discouraging the constitution of reserves, which were remunerated at a much lower marginal deposit rate. But at the same time, this decision further reduced the size of the interest rate corridor, which fell from 100 to 50 basis points. It soon became apparent that such a margin was insufficient to enable the money market to function without the intervention of the central bank. In addition, the spread between permanent facility rates became insufficiently dissuasive to prevent the constitution of excess reserves with the central bank. Faced with a situation of extreme uncertainty, the banks wanted to build up a cushion of liquidity that would enable them to cope with future shocks. They therefore sought to take full advantage of the additional liquidity available from the Eurosystem in order to put it back into …the Eurosystem. The amounts deposited with this facility, which normally averaged less than EUR 1 billion, literally exploded, reaching nearly EUR 250 billion in a few days and then fluctuating between EUR 200 billion and EUR 300 billion until the Eurosystem decided, in December 2008, to abandon this measure on 21 January 2009 (cf. diagram 10). The result was a rapid decline in the amounts placed with the permanent deposit facility until the start of the first one-year refinancing operation mentioned above in June 2009.

Diagram 10: Amounts placed with the deposit facility and the rate corridor



This operation, and those that followed, contributed to a very significant increase in excess reserves, as shown in Diagram 11.

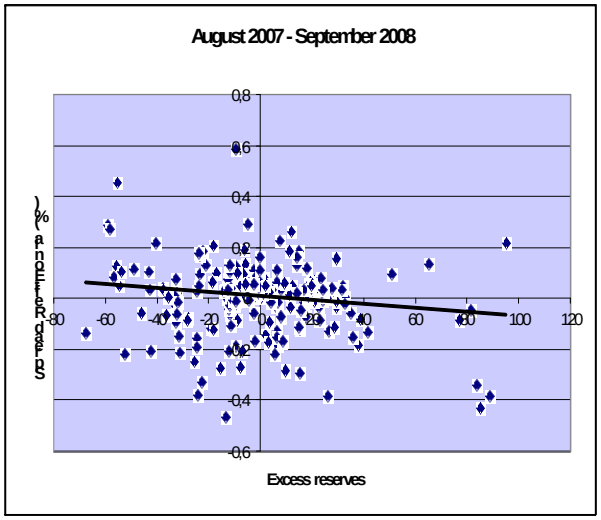
Diagram 11 – Excess reserves held by Monetary and Financial Institutions with the Eurosystem (Euro billions)



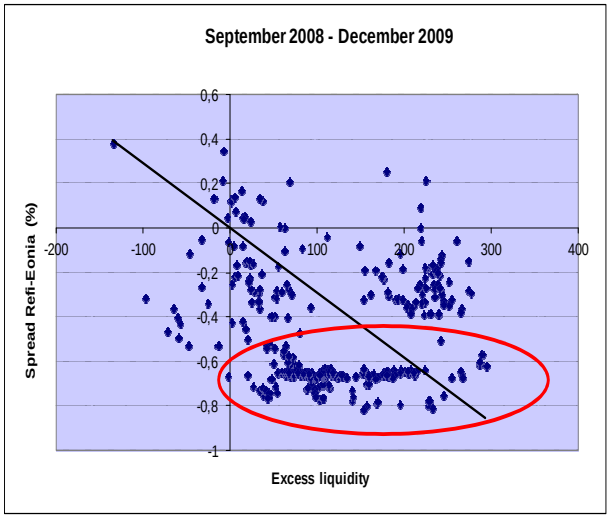
These excess reserves, which normally fluctuated around an average of zero, rose to a record level of close to EUR 120 billion between October 2008 and December 2009.

Such levels explain the very strong downward pressures on the overnight money market rate and the persistent gap between the latter and the repo rate – some 65 basis points since June 2009. Thus, unlike the situation before the crisis, where the state of money market liquidity was disconnected from money market interest rate levels (cf. Diagram 3), a liquidity effect gradually became apparent. This became increasingly marked after June 2009 (cf. Diagram 12) as the level of excess reserves enabled the market rate to stabilise at a level close to 0.35 basis points (cf. red outline, right side of Diagram 12).

Diagram 12 – Liquidity effect in the euro area



Refi-EONIA spread (percentage points)



Excess reserves (Euro billions)

Under these conditions, it is no longer possible to maintain the separation principle. Liquidity management and monetary policy become increasingly interdependent as the interest rate approaches the zero lower bound.

In such situations, the central bank may face two potential pitfalls. At the macroeconomic level, economic agents may draw the conclusion that the bank has relinquished its key goal, which is to ensure medium-term price stability, in favour of maintaining very short-term financial stability. This perception is likely to increase moral hazard effects and lead to excessively risky behaviours. At the microeconomic level, the banks delegate management of their liquidity to the central bank and become less involved in forecasting their future central liquidity needs. That being the case, there are few incentives to manage liquidity prudently. This phenomenon is reinforced for the more fragile banks, for whom refinancing is no longer possible on the money market, and who therefore depend exclusively on the unlimited fixed-rate refinancing policy adopted by the ECB.

The next challenge for the central banks will be to extricate themselves from these crisis measures, which have already begun to be dismantled with the termination of certain liquidity supply programmes in the United States, the cessation of one-year refinancing operations in the euro area after December 2009 and the ending of six-month operations from April 2010. Nevertheless, the exit strategy must not be restricted merely to the reinstatement of the previous operational framework, which was based in part on the separation principle.

Conclusion

During the period that preceded the crisis, the ECB practised the art of central banking in accordance with the separation principle recommended by academic papers. There was no interference between its monetary policy – focused on the goal of price stability – and its credit and interest rate policies – designed to ensure financial stability, in other words stability of the money market. In this context, the application of this principle proved effective since there is general agreement that both goals were achieved.

So has the ECB sought to maintain the principle subsequently? Although the ECB was successful during the first part of the crisis, the task became increasingly difficult as the crisis worsened after October 2008. The measures adopted by the ECB at times led to increasing interference between monetary, credit and interest rate policy, to the point where we may legitimately wonder whether the principle is sustainable. The suspension of the principle raises questions about the ECB's true purpose and the incentives provided to the private sector, in particular the banking sector, in the euro area.

More generally, the recent experience of the ECB and that of the other central banks has led us to doubt the merits of the principle. Its justification in the academic literature is based on the implicit assumption that financial imperfections are limited to the banking liquidity market and affect neither the securities market nor the credit market. Under such circumstances, the central bank can simply use its credit policy and its interest rate policy to accommodate transient shocks to bank liquidity without this interfering with its monetary policy. But the crisis showed that the theoreticians had underestimated the extent of these financial imperfections and their consequences on the action of the central bank in the event of a major shock. A re-examination of the separation principle is required and two solutions may be envisaged: the first would consist in ending separation by introducing concerns about financial stability into monetary policy; the second solution would maintain separation but would expand the range of instruments currently available to the central bank to ensure financial stability, which would no longer be identified only with the money market. It is important that ideas and proposals on this subject should rank high in the research programmes of our universities and central banks.

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